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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/821,589

04/09/2004

Yosuke Hosoya

09792909-5854

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7590

11/12/2008

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EXAMINER

CANTELMO, GREGG

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

11/12/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/821,589

Applicant(s)

HOSOYA ET AL.

Examiner

Gregg Cantelmo

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/2/08 & 10/2/08.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 2, 2008 has been entered.

Response to Amendment

2. In response to the amendment received September 2, 2008, entered as per the RCE identified above:
- a. Claims 1-7 are pending;
 - b. The prior art rejections stand as modified in light of the amendment to the claims.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '643 in view of either U.S. Patent Application Publication No. 2005/0153205 (Hisashi), U.S. Patent Application Publication No. 2004/0058245 (Fujimoto), U.S. Patent Application Publication No. 2002/0136955 (Park) or JP 2001-015101 (JP '101).

JP '643 discloses a positive active material comprising: particles of a compound oxide of lithium and a transition metal 1 (figures and paragraphs 10 and 24) having an inherent layered structure thereby permitting the intercalation/deintercalation of lithium during charging/discharging and a coating layer on the active material 1 wherein the coating layer comprises an inorganic lithium compound 4 (paragraphs 10 and 23) and a carbonaceous conductive material 3 (paragraph 10 and 23 as applied to claim 1). The inorganic compound 4 is a lithium compound (paragraph 23 as applied to claim 1). The weight ratio of the particles 1 to the coating 2/3/4 teaches of particle weights of 10 grams relative to about 1 gram of coating material (see examples for weight ratios). Thus JP '643 teaches that the weight ratio of the particles will clearly be at least 70% but less than 98% relative to the coating layer 2/3/4 (as applied to claim 4).

JP '643 does not teach that the product is a mechanofused coating.

Mechanofusion processes for coating active materials does not represent a novel contribution to the art and such process modifications would have been well within the skill of the ordinary worker in the art.

Hisashi teaches of using mechanofusion to apply a shell coating to an active material particle (para. 46). Fujimoto also recognized the use of mechanofusion systems for fabricating active material in batteries (paras. 19, 21, 24, 25). JP '151 recognized the use of a mechanofusion process to coat a core active particle used as an active material in a battery (abstract and Figs. 1-3). Park also recognized the use of mechanofusion systems for fabricating active material in batteries (fig. 10 and para. 35).

Mechanofusing a surface coating onto a base particle for active materials is well recognized in the art by at least the teachings of Hisashi, Fujimoto, JP '151 and Park and would have provided a variety of recognized benefits. In the process, particles are introduced into a mechanofusion system such as that shown in Fig. 10 of Park. Particles are then trapped between the wall and a rotating inner head; the shearing force the particles experience in this gap causes them to fuse together. The resulting partially fused (coated) particles are constantly recycled to obtain uniform surface coverage. When used for encapsulating electroactive particles the process encourages the formation of encapsulated electroactive particles having improved adhesion between the coating and the base and also a more uniform aspect ratio, as the shearing force also smoothes the finished particles.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '643 by forming the coating on the core particles using a mechanofusion process as suggested by either Hisashi, Fujimoto, JP '151 or Park since it would have provided a shell having improved adhesion between the core and the coating.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '643 in view of either Hisashi, Fujimoto, JP '151 or Park as applied to claim 1 above, and further in view of Yamaura, Takada or Mohwald.

The difference between claim 2 and JP '643 is that JP '643 does not teach of the inorganic material being either lithium iron phosphate or lithium phosphate.

Essentially JP '643 teaches of coating lithium metal oxide base particles with a mixture of an inorganic conducting material and an electron conducting material.

While the inorganic conducting materials taught by JP '643 are not inclusive of either lithium iron phosphate or lithium phosphate, JP '643 does teach that the inorganic material is a lithium ion conductive inorganic solid electrolyte material (see abstract). Thus one of ordinary skill in the art would have reasonably appreciated that the inorganic material coated on the positive electrode active material could reasonably be any known teach that the inorganic material is a lithium ion with a reasonable expectation that any such combination would effectively operate in the desired manner taught by JP '643, absent clear evidence to the contrary.

Each of lithium iron phosphate and lithium phosphate are art recognized ion conductive materials used in lithium secondary batteries as shown by either Yamaura (col. 5, ll. 33-37); Takada (col. 1, ll. 32-55); or Mohwald (col. 4, ll. 43-65). Thus it would have been apparent to one of ordinary skill in the art to use either lithium iron phosphate or lithium phosphate as an alternative ion conducting inorganic material coated onto the positive electrode since the primary reference teaches that it is generally known to coat lithium metal oxide base particles with a mixture of a lithium ion conducting inorganic material and an electron conducting material and since the specific inorganic materials of lithium iron phosphate and lithium phosphate are art recognized ion conductive materials used in lithium secondary batteries as shown by either Yamaura, Takada, or Mohwald.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '643 by selecting the lithium ion conducting inorganic material to be either lithium iron phosphate or lithium phosphate since such materials are art recognized lithium ion conducting inorganic materials as shown by either Yamaura, Takada, or Mohwald and one of ordinary skill in the art would have found such a modification to have provided the predictable result of providing a coating to the positive active material having both the requisite electron conducting and lithium ion conducting properties. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07. See also *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '643 in view of either Hisashi, Fujimoto, JP '151 or Park as applied to claim 1 above.

The difference between claim 3 and JP '643 is that JP '643 does not teach of the weight ratio between the inorganic material to the carbonaceous material being between 99:1 and 60:40.

While JP '643 discloses providing both an inorganic component 4 and carbon component 3 in a coating material to a positive active material 1, the disclosure does not specifically teach of the ratio of these two materials, however it is clear that there is an inherent ratio between these two components.

Varying the amount of each of components 2, 3 and 4 of the coating layer are recognizable optimizable components. One of ordinary skill in the art would have recognized that by varying the amount of carbon in the film, the electronic conductivity of film would vary accordingly. One of ordinary skill in the art would have also recognized that by varying the amount of the inorganic lithium compound in the film, the ionic conductivity of the film would vary accordingly. Adjusting the ratios of both materials will optimize the ionic and electronic conductivity of the film and selection of the claimed ratio would have been obvious to one of ordinary skill in the art since it would have provided a coating which exhibited optimal ionic and electronic conductivities.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '643 by adjusting the ratios of both the carbon component and inorganic component of the film of JP '643 within the ratio defined in claim 3 since the optimization of these would have been a recognized result-effective variable which could have been optimized since it would have provided a coating which exhibited optimal ionic and electronic conductivities.

Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima

facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

6. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '643 in view of either Hisashi, Fujimoto, JP '151 or Park and further in view of either U.S. Patent No. 4,668,594 (Yamaura); U.S. Patent No. 5,958,281 (Takada) or U.S. Patent No. 6,475,663 (Mohwald).

JP '643 discloses a positive active material comprising: particles of a compound oxide of lithium and a transition metal 1 (figures and paragraphs 10 and 24) having an inherent layered structure thereby permitting the intercalation/deintercalation of lithium during charging/discharging and a coating layer on the active material 1 wherein the coating layer comprises an inorganic lithium compound 4 (paragraphs 10 and 23) and a carbonaceous conductive material 3 (paragraph 10 and 23 as applied to claim 5). The inorganic compound 4 is a lithium compound (paragraph 23 as applied to claim 5). The weight ratio of the particles 1 to the coating 2/3/4 teaches of particle weights of 10 grams relative to about 1 gram of coating material (see examples for weight ratios). Thus JP '643 teaches that the weight ratio of the particles will clearly be at least 70% but less than 98% relative to the coating layer 2/3/4 (as applied to claim 7).

JP '643 discloses a nonaqueous secondary battery comprising: a negative active material and a positive active material comprising: particles of a compound oxide of lithium and a transition metal 1 (figures and paragraphs 10 and 24) having an inherent layered structure thereby permitting the intercalation/deintercalation of lithium during

charging/discharging and a coating layer on the active material 1 wherein the coating layer comprises an inorganic lithium compound 4 (paragraphs 10 and 23) and a carbonaceous conductive material 3 (paragraph 10 and 23 as applied to claim 5).

JP '643 does not specify that the inorganic material is either lithium iron phosphate or lithium phosphate (claim 5) or the weight ratio between the inorganic material to the carbonaceous material being between 99:1 and 60:40 (claim 6).

Regarding the inorganic material being either lithium iron phosphate or lithium phosphate (claim and 5):

Essentially JP '643 teaches of coating lithium metal oxide base particles with a mixture of an inorganic conducting material and an electron conducting material.

While the inorganic conducting materials taught by JP '643 are not inclusive of either lithium iron phosphate or lithium phosphate, JP '643 does teach that the inorganic material is a lithium ion conductive inorganic solid electrolyte material (see abstract). Thus one of ordinary skill in the art would have reasonably appreciated that the inorganic material coated on the positive electrode active material could reasonably be any known teach that the inorganic material is a lithium ion with a reasonable expectation that any such combination would effectively operate in the desired manner taught by JP '643, absent clear evidence to the contrary.

Each of lithium iron phosphate and lithium phosphate are art recognized ion conductive materials used in lithium secondary batteries as shown by either Yamaura (col. 5, ll. 33-37); Takada (col. 1, ll. 32-55); or Mohwald (col. 4, ll. 43-65). Thus it would have been apparent to one of ordinary skill in the art to use either lithium iron phosphate

or lithium phosphate as an alternative ion conducting inorganic material coated onto the positive electrode since the primary reference teaches that it is generally known to coat lithium metal oxide base particles with a mixture of a lithium ion conducting inorganic material and an electron conducting material and since the specific inorganic materials of lithium iron phosphate and lithium phosphate are art recognized ion conductive materials used in lithium secondary batteries as shown by either Yamaura, Takada, or Mohwald.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '643 by selecting the lithium ion conducting inorganic material to be either lithium iron phosphate or lithium phosphate since such materials are art recognized lithium ion conducting inorganic materials as shown by either Yamaura, Takada, or Mohwald and one of ordinary skill in the art would have found such a modification to have provided the predictable result of providing a coating to the positive active material having both the requisite electron conducting and lithium ion conducting properties. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07. See also *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). Regarding the weight ratio between the inorganic material to the carbonaceous material being between 99:1 and 60:40 (claim 6):

While JP '643 discloses providing both an inorganic component 4 and carbon component 3 in a coating material to a positive active material 1, the disclosure does not specifically teach of the ratio of these two materials, however it is clear that there is an inherent ratio between these two components.

Varying the amount of each of components 2, 3 and 4 of the coating layer are recognizable optimizable components. One of ordinary skill in the art would have recognized that by varying the amount of carbon in the film, the electronic conductivity of film would vary accordingly. One of ordinary skill in the art would have also recognized that by varying the amount of the inorganic lithium compound in the film, the ionic conductivity of the film would vary accordingly. Adjusting the ratios of both materials will optimize the ionic and electronic conductivity of the film and selection of the claimed ratio would have been obvious to one of ordinary skill in the art since it would have provided a coating which exhibited optimal ionic and electronic conductivities.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '643 by adjusting the ratios of both the carbon component and inorganic component of the film of JP '643 within the ratio defined in claim 6 since the optimization of these would have been a recognized result-effective variable which could have been optimized since it would have provided a coating which exhibited optimal ionic and electronic conductivities.

Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is

critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

Response to Arguments

7. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.

The additional recitation of the claimed surface mixture being a mechanofused mixture is not held to patentably distinguish the claimed invention over the prior art rejections of record since the concept of mechanofusing active materials in batteries and coatings onto active material particles is well known in the art (as shown by each of Hisashi, Fujimoto, JP '151 or Park).

Therefore the claimed invention is still held to be obviated by the prior art relied in the rejections above.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Gregg Cantelmo/
Primary Examiner, Art Unit 1795